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FRANCE: NUCLEAR, MISSILE, AND SPACE DEVELOPMENTS
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ATLIS 2 LASER MISSILE GUIDANCE POD TO BE MASS PRODUCED

Paris AIR & COSMOS in French 4 Nov 78 p 41

[Article by Pierre Langereux]

[Text] The French Air Force is undoubtedly going to be the world's first able to equip its single-seat aircraft with a pod for fire control and automatic objective designation by laser beam, in this instance the Thomson-CSF [Thomson-General Radio Company] Atlis 2 pod. As a matter of fact the air force has just authorized mass production of the Atlis 2 pod in order to equip the single-seat Jaguar and Mirage 2000. These airplanes will be able to use the French Atlis 2 pod for launching various laser guided missiles (utilizing the Ariel laser self-guidance of Thomson-CSF) such as the AS 30 Laser air-ground missile of AEROSPATIALE [National Industrial Aerospace Company] (with range of 10 to 12 kilomters) and the 100-millimeter rocket of Thomson-brandt (with range of 1 to 6 kilometers) which has already undergone 100 test firings from Mirage 3 and Mirage F1 airplanes, as well as the MATRA-SAMP 400-kilogram bomb in the project phase (with a laser head derived from the Ariel).

Operational evaluation of the Atlis 2 pod, which took place from October 1976 to January 1978 at the Cazaux Flight Test Center with a Jaguar was highly satisfactory. It proved that an experienced pilot could effectively operate the pod after only two training flights. The tests made it possible to verify the compatibility of the pod with the aircraft and the AS 30 laser missile; it even showed it was possible to spot objectives through a small cloud or fog bank, which had not been expected.

The Atlis 2 pod, developed cooperatively by Thomson-CSF of France and Martin Marietta of the United States, will be massed produced for the French air force with Thomson-CSF as general contractor. The initial phase of the mass production comprises an evaluation (in progress) of the second prototype pod conforming to the production specifications (weight reduced to 125 kilograms, extended range of utilization, interchangeability, self-testing, interface with modern aircraft, and common logistics) as well as a qualification phase (mechanical tests, thermal tests, and so forth) with another pod, and fabrication of production tooling.

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Martin Marietta is participating in the definition of the production pod in order that it be compatible with the American F 16 airplane with a view toward joint French and American production of the Atlis 2. Martin Marietta in particular has with its own funds financed fabrication of a complete pod for flight tests aboard the F 16 which took place in July-August 1978 in the desert area of China Lake, California. The compatibility of this pod with the F 16 was demonstrated; likewise the performance of the system: stability of laser illumination from the airplane as good as that from the ground, and precision of guidance to various targets (tanks, mobile guns, and so forth). The tests also showed the feasibility of changing a missile's objective after launching and of attacking a group of from three to six tanks in a single pass (by successive designation of targets to the missiles after the first acquisition). An anecdote illustrates the performance level of the Atlis pod: the American pilots were amazed at being able to "track" a rabbit at distance of 3 kilometers from an F 16 flying at 150-200 meters altitude.

The U.S. Air Force is very much interested in the Atlis pod, which is the only one now existing in the United States for single-seat airplanes; the other existing American pods (Northrop's LATAR and Westinghouse's Dave Penny) are designed solely for two-seat aircraft. The Atlis 2 pod is also of interest to NATO countries which have the F 16. It was recently shown to the British chief of staff as a pod associated with Sabre light laser guided air-ground missiles. The Luftwaffe is also interested for equipping its Phantom and Tornado aircraft. For its part the German Dornier firm is to study the feasibility of installing the pod upon the Alpha-Jet.

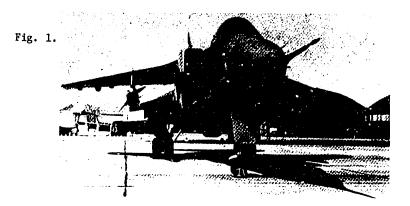


Fig. 1. A Jaguar armed with AS 30 Laser missiles in association with the Atlis 2 pod

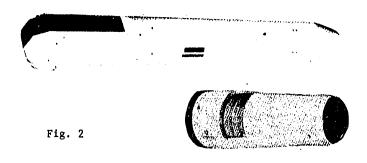


Fig. 3

- Fig. 2. The Atlis 2 laser pod weights 125 kg and is 2.48 meters long by 0.3 meter in diameter: it consumes 1,600 watts in tracking, plus the laser; the field of vision is 320 degrees.
- Fig. 3. The Ariel self-guidance of the AS 30L missile and 100-millimeter rocket.

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NUCLEAR ENERGY PROGRAM COSTS, DEVELOPMENT DEBATED

Paris LE MONDE in French 10 Jan 79 pp 1, 40

/Article by Bruno Dethomas: "The Cost Overrun in the French Nuclear Program"/

Text/ Despite some delays, the French nuclear program is following its course in a normal way. The two Fessenheim reactors produced more than 11 billion kilowatt-hours in 1978, which is considerably more than the forecasts. Nevertheless, relations between one of the principal builders of reactors, the Framatome Company, and Electricite de France /EDF/ are especially tense at present. A dispute has arisen about the cost overrun for this program, caused by the increased security measures as well as by the construction delays. The matter is an important one, since more than one billion francs is involved.

Who Is Going to Pay?

Civilian atomic energy seems to be proceeding well. In 1978, the proportion of electricity of nuclear origin went over the 10-percent threshold for the first time, reaching 13 percent of the electricity supplied by EDF. And the first two reactors of the pressurized-water reactor (PWR) 900-megawatt series, Fessenheim 1 and 2, had an average in-service rate of 70 percent and 78 percent, which is far above the 50-percent rate postulated in the commission's studies for production of electricity of nuclear origin (PEON) for the first year of industrial service.

Since five additional reactors are to be coupled to the network in 1979 and six more in 1980, those responsible for the program do not lack reasons for rejoicing—all the more so in that the construction times are improving. "Look at Tricastin," declares Mr Hug, director of equipment in EDF; "the first cubic meter of concrete was poured in December 1974, and the reactor will be placed in service during 1979, less than 5 years later."

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Nevertheless, rarely have EDF's relations with Framatome, the builder of the boilers—the main part of the power plant—been so tense. Is it a mere quarrel among engineers, as was the case between EDF and the Atomic Energy Commission in the heyday of graphite—gas? Is it a Manichaean diatribe by a "good" public enterprise against a "bad" private company? A gloomy story of dollars and cents? A little of all three, doubtlessly, but the third one embitters the other two.

When Framatome, at the beginning of the 1970's, contracted to build the boilers for Fessenheim and Bugey, the company did not know what it was in for. Provided with a Westinghouse license, it simply went to work to copy the American "reference" power plant of Beaver Valley.

At that time, there was no question of quality control—instituted by a decree of 26 February 1974, with retroactive effect on the orders previous to that date—and the company was not at all like what it has happily become today. Henceforth, with the new rules, it takes 68 months to build a boiler—"a reasonable period, shorter than those in the United States or even West Germany," it is said in the Creusot-Loire subsidiary.

But as for the parts sent back to the subcontractors to make them conform to the new norms, and the delays which have resulted from this--Framatome does not intend to bear these alone, and it has presented its customer EDF with an additional bill considered a bit excessive by the ministry as well as by Rue de Monceau. Only a few percent of the contract is involved, of course, but this represents more than one billion francs.

It is therefore an important matter to know who will bear the penalities of the delay, when the cost revision will be ordered, and who will pay for the program planning upheaval which has obliged Framatome to hire more personnel than had been anticipated. Will it be the boiler builder, EDF, or the Ministry of Finance in the name of an administration responsible—knowingly—for a part of this delay?

The dispute is embittered by the private and monopolistic character of the Creusot-Loire subsidiary. Any rise in prices—even if justified—is immediately translated, in the atrongly unionized EDF, into: "They're giving money to Baron Empain." Mr Hug, though, pays tribute to Framatome when he admits that "neither its construction times nor its prices are equalled anywhere in the world." But how are certain price add—ons to be presented to the board of directors, on which the trade unionists sit? If it did not take so long to present a case against a public establishment, it is not certain that a "fair trial" would not clam everyone down. Some of EDF's managers may dream of being able to take shelter behind a decision in the courts to determine "who should pay whom."

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^{1.} Framatome employs 4,200 persons, as against 600 in 1972.

The 1,300-Megawatt Adventure

Another current anxiety for the French nuclear program: the passage to the 1,300-megawatt $/\overline{\text{MW}}/$ level. The 900-MW reactors are now known; 22 reactors (perhaps 30) of this type will be installed. The benefit of this standardization should be felt in the costs, construction times and reliability.

Why, then, begin a series of 1,300-MW reactors, which are unexplored territory? As was the case with the 900-MW reactors, Framatome has bought a license from the American group Westinghouse, for a certain number of millions; but Westinghouse has got so far behind in construction of the first reactor of this type, in southern Texas, that the first French model, located at Paluel in Seine-Maritime, will be coupled to EDF's network long before the American power plant is placed in service.

Moreover, building a 1,300-MW reactor poses a technical problem. It is not a matter of simply extrapolating from the 900-MW model. The latter has three cooling loops. The addition of a fourth loop (which comprises a pump, a motor, a steam generator and a pressurizer) identical with the other three would pose no construction problem.

The case is not the same as regards the 1,300-MW. The reactor's calandria is bigger, and this increased size has an effect on the steam generators as well as on the design of the control circuits. Therefore one does not benefit from the standardization of the parts of the 900-MW reactors. The truth of this is illustrated by the fact that whereas in 1976 the PEON commission justified the passage to 1,300 MW by an economic gain (the so-called economies of scale), EDF is obliged today to acknowledge that Paluel is—per kilowatt installed—" at least as expensive" as the 900-MW reactors.

Hug continues to think that these new reactors will benefit from the "reservoir of innovations perfected by EDF's researchers in recent years" and that their greater margin of power will rapidly make it possible to improve their economic efficiency by at least 7 percent.

But hasn't EDF quite simply let itself follow its tendency to build bigger and bigger termal power plants (125 MW between 1951 and 1960, 250 MW between 1956 and 1970, 600 to 700 MW from 1964 to 1973, 900 from 1970 to 1978, 1,300 MW starting in 1978), without taking account of possible "diseconomies of scale" which some American researchers now put, nevertheless, at well below 1,000 MW? Or has it seen advantages in the face of the "difficulty of finding nuclear sites and the desire not to multiply them, both for reasons of safety and for their mainly psychological impact on the environment," as an official in the equipment department, Mr Durr, has written in the REVUE TECHNIQUE DE L'ENERGIE?

Whatever the case may be, the national enterprise, which loves to be mistress of technology and decision, has launched its engineers—the only equipment department in the picture besides Framatome—into the adventure, even though several French officials in the nuclear sector consider this bet economically ruinous and industrially uncertain.

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Despite the silence of the ecologists, dispersed by a severe setback in the legislative elections of March 1978, and despite the government's deliberate circumspection and the good health of the present program, nuclear energy—as one sees—has not finished making people talk about it.

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INITIAL ARIAME LAUNCHING DELAYED UNTIL NOVEMBER

Paris LE MONDE in French 19 Jan 79 p 24

[Article by M.A.]

[Text] The first firing of the Ariane European launch vehicle will not take place before the beginning of November 1979. This decision has just been made in the European Space Agency by the council in charge of the Ariane program. This launching had been scheduled provisionally for 15 June 1979, but it had already been admitted that it would not take place until the end of July or in September.

The postponement to next November results from the explosion that occurred on 28 November 1978, at the time of a test of the third stage of the launch vehicle. Although the inquiry has not been completed, it seems to be established that this accident is due to malfunctioning of a device on the testbed and not to the stage itself, whose design is thus not subject to question. The engine of this third stage, supplied by a mixture of hydrogen and liquid oxygen, is designed to operate in a vacuum. Now, testing is conducted on the ground, therefore at atmospheric pressure. A special firing device is used that did not operate exactly at the scheduled instant. This caused an explosion of the hydrogen accumulated in the piping system, damaging the engine and the facilities somewhat.

A New Engine

The need for installing a new engine and for resuming the test sequence has thus led to a postponement of the initial launching and, consequently, of the next two. The four flights in the development program are now scheduled as follows: L01, at the beginning of November 1979 (instead of June); L02, at the beginning of March 1980 (instead of December 1979); L03, in June 1980 (instead of May). L04 is still scheduled for October 1980.

Therefore, the delay should not have any repercussion on commercial launchings of Ariane that should start in April 1981 with the placing in orbit

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of the Exosat scientific satellite (European X-ray astronomy satellite), unless the International Intelsat Communication Organization requests priority for launching an Intelsat-5 satellite, which would then replace Exosat.

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BRIEFS

HADES MISSILE ANNOUNCED--The French general staff plans to replace the Pluton missile with ramjet-powered missiles, rather than powder-powered ones, so as to increase their accuracy. Their range will be more than 200 kilometers, which will enable the nuclear weapon's firing ramp to be set up outside the combat zone. This supermissile will probably be called the "Hades" after the Greek god of the netherworld. [Text] [Paris PARIS MATCH in French 9 Feb 79 p 65]

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END

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